4 MANAGEMENT ACTIVITIES

The objective of OST's program management process is to provide a structured approach to program planning, budgeting, execution, and evaluation that uses end-user input; facilitates end-user involvement; meets corporate budget request schedules and requirements; promotes effective project management and accomplishment; and ensures sound decision-making.

The IPABS Handbook **includes attributes that integrate EM business processes and facilitate overall EM project management. Aspects of IPABS include:**

- **Organizing all EM work into EM projects with an associated focus on Field project management**
- **Developing and maintaining Project Baseline Summaries (PBS) as the primary source of summary project information**
- **Using performance measures to ensure accountability**
- **Providing monthly project management tracking**
- **Developing Integrated Annual Paths to Closure/ Budget Guidance**
- **Developing and implementing the IPABS Information System (IPABS-IS)**
- **Supporting EM Corporate Database to meet IPABS information requirements.**

As shown in Figure 4.1, OST's program management activities occur within the framework of EM's top-level business processes, which are documented in EM's *Integrated Planning, and Budgeting System (IPABS) Handbook*, a project-based management system that is evolving to support the EM Program. OST's management approach is tailored to the IPABS framework, and meets all IPABS requirements as well as lower-level management needs throughout the OST program. The OST Technology Management System (TMS) is an adjunct system to the IPABS-Information System (IPABS-IS), which provides specific information about OST technology initiatives and serves as a repository for management-level data and high-level technical information. Both systems are discussed further in Section 5.

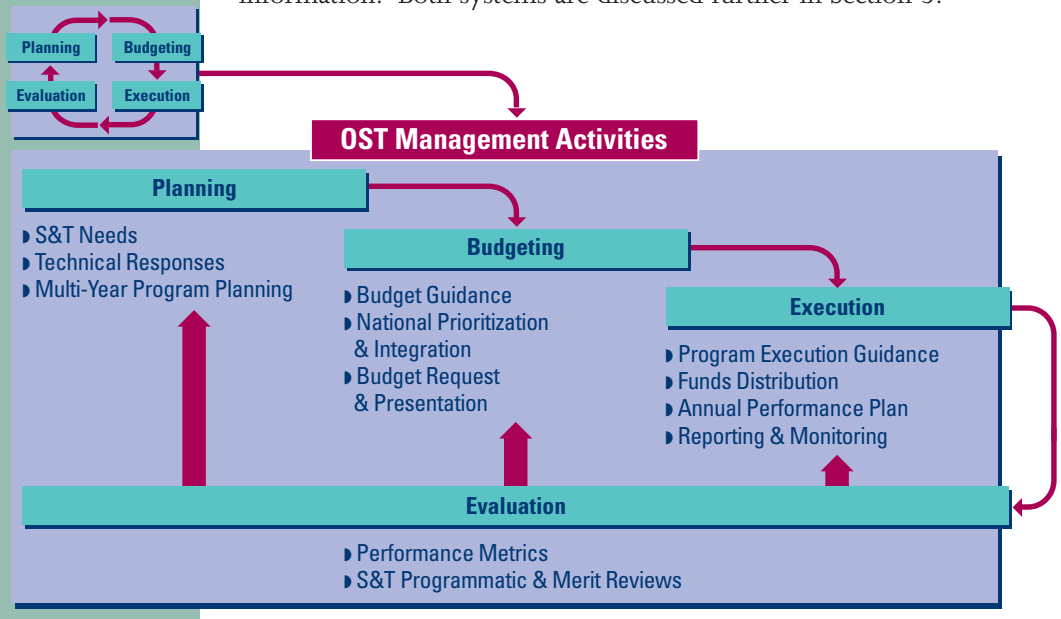


Figure 4.1 - OST Management Activities.

Major Annual EM Business Process Milestone

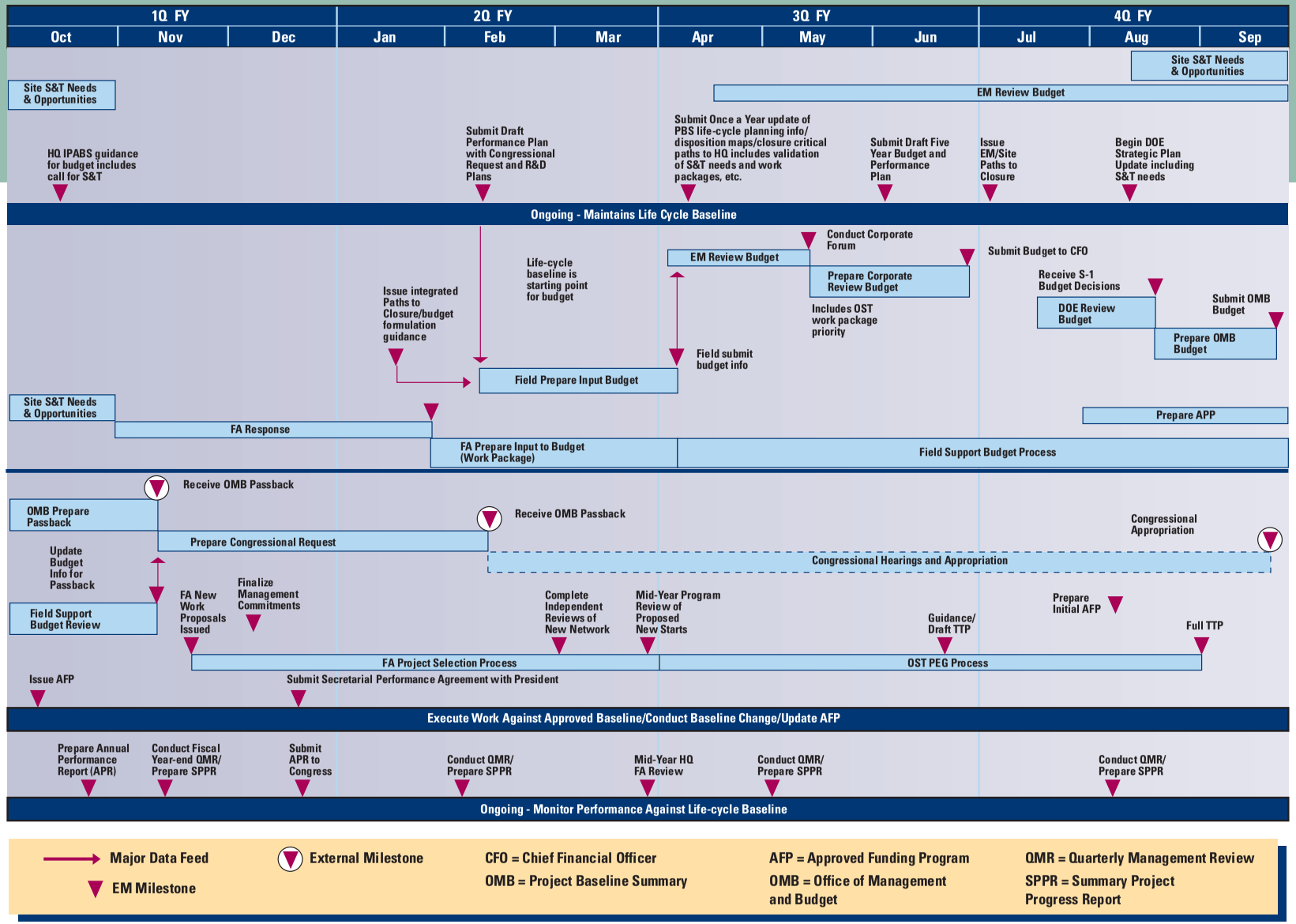


Figure 4.2 - The Annual EM Business Process milestones from the IPABS Handbook.

The annual EM business process milestones diagram from the *IPABS Handbook* (Figure 4.2), depicts the full planning, budgeting, execution, and evaluation cycle. The figure presents the steps needed to coordinate OST-related processes with linkages and flows of information required for managing OST and other EM programs. Relative milestone dates for key OST Headquarters and Field processes and products are illustrated below their respective Month and FY Quarter columns. The actual "annual" budget formulation process takes up to nearly 2 years for a full cycle. Figure 4.2 can be referred to throughout Section 4 of this *Management Plan*.

In addition to S&T investments that directly address project-related cleanup needs, EM invests in basic research through the EM Science Program (EMSP). The EMSP process used to determine how these investments are made is, by nature, different from the rest of the technology development management process, and is described in Section 4.5.

4.1 Planning

Planning is real-world based, not ivory-tower theory.

Information from *Accelerating Cleanup: Paths to Closure*, combined with EM's enhanced performance goals for cleanup, form the foundation upon which OST plans its strategy, programs, and specific projects. Representing the EM cleanup program's framework, *Paths to Closure* is an EM-wide management tool, updated annually, that reflects the Field management's best judgments as to what can be achieved at each site. Included in the *Paths to Closure* for each EM project are Program Baseline Summaries (PBSs), which summarize the detailed scope, schedule, and cost information used in EM planning, budgeting, execution, and evaluation activities.

OST's management activities are organized into four steps:

- ***Planning: needs identification and validation, technical response and Multi-year Program Plan formulation***
- ***Budgeting: prioritization and budget requests and presentations***
- ***Execution: Program Execution Guidance, funds distribution, reporting and monitoring, and baseline change control***
- ***Evaluation: performance metrics and reviews.***

The key components of OST's planning process, shown in Figure 4.3, are identifying and validating S&T needs, formulating technical responses, and collaborative program planning among Focus Areas and site technology users to develop a program that integrates solutions with identified needs. This process is critical to building a partnership between technology providers and end users to enable implementation of technology solutions.

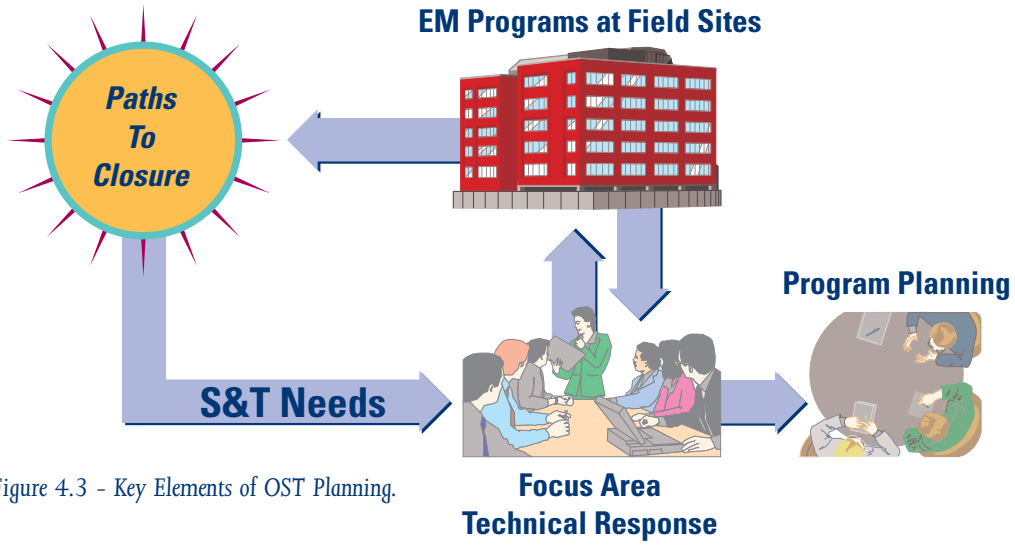


Figure 4.3 - Key Elements of OST Planning.

4.1.1 Needs Identification and Validation

OST needs identification (Figure 4.4) is the first step in developing technical solutions to address EM's cleanup-problems. A calendar of events in the needs determination process is shown in Appendix E. Program needs are currently derived from technology needs developed by end users through Site Technology Coordination Group (STCGs) and documented in the Needs and Opportunities Statement.

- **Needs and Opportunities Statements include information on the priority, timing, (including potential deployment/implementation schedule) and technical detail associated with a site problem**
- **Disposition Maps illustrate the maturity of the planned technological solution (e.g., bench scale prototype to an existing operating facility)**
- **Critical Pathway Analysis provides an understanding of the maturity of the technological solution linked to the risk to key activities and events in the path to complete site cleanup**
- **Project Baseline Summary information includes life-cycle cost, schedule, current technical approach, and environment, safety, and health risks.**

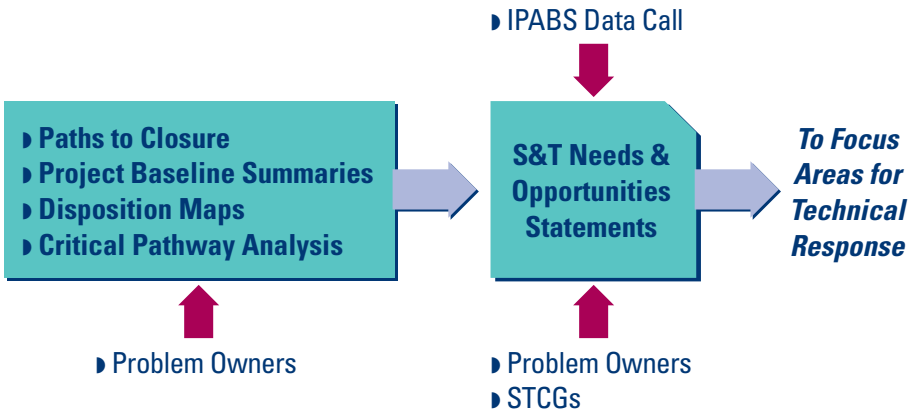


Figure 4.4 - Site S&T Needs.

These statements are prepared annually in response to an EM-IPABS data call to the Field. These needs reflect stakeholder values determined by their participation in establishing site-specific compliance agreements and identifying site needs. Site management then identifies, validates, and prioritizes technology needs and opportunities for site-specific EM programs. Disposition Maps, Critical Pathway Analyses, and information in the PBSs provide additional information on the priority, timing, and technical detail associated with site problems. This information provides the fundamental basis for developing a technical response.

4.1.2 Formulating the Technical Response

Using information collected during the needs identification and validation process, Focus Areas examine fully integrated solutions to respond to sites' needs. This results in a technical response, developed through continuous dialogue with relevant EM end user(s), as shown in Figure 4.5. The technical response could be a MYPP, Work Packages (WPs), product line, alternative technology consulting, technology deployment support, or technology projects. The response defines and communicates the Focus Area's strategy for addressing specific site(s) and end-user(s) needs. Documenting the technical response

The technical response defines and communicates the Focus Area's strategy for addressing specific site and end-user needs.

strategy as well as performance metrics, discussed later in this section, provides a framework for developing test plans, commercializing strategies, and project review criteria.

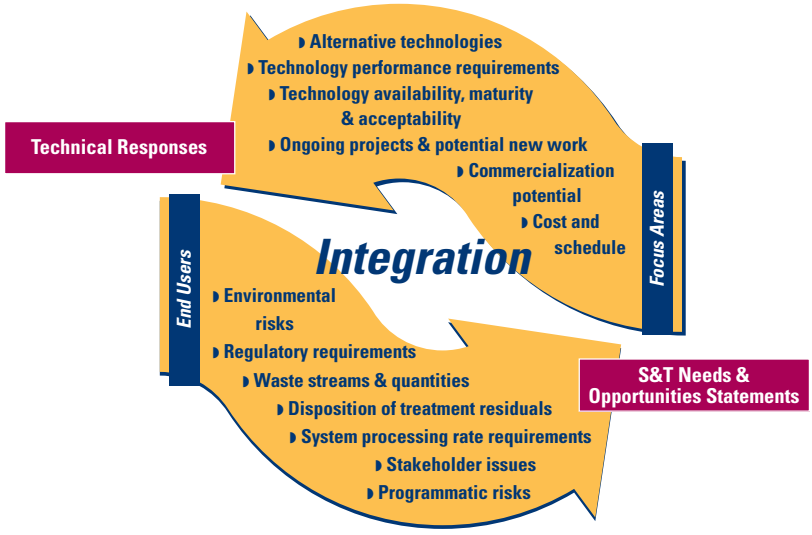


Figure 4.5 - Focus Area Technical Response.

To prepare the technical response, Focus Area teams consider:

- **Ongoing S&T projects**
- **Potential new projects and initiatives**
- **Unaddressed needs or portion of needs**
- **Alternative solutions, such as off-the-shelf technologies and existing technologies**
- **Procurement approaches for performing new work**
- **Estimated technology development cost and schedule.**

Focus Areas develop the technical responses based on direct discussions with end users. The response strategy is typically at a higher level than any individual technology. However, specific technologies may be identified if appropriate. Focus Areas also evaluate science, crosscutting, and other considerations to ensure a wide span of review and comment before prioritization and budgeting takes place. Senior EM management and site end users validate the response. Throughout this integration process, joint planning ensures that budgets support the development efforts, schedules line up with technology insertion points, and the cleanup programs have the financial resources and technical support needed for implementing and deploying new solutions.

Technical responses are used by research and technology providers to refine and modify work scopes, costs, and schedules.

Once developed, user needs and Focus Area technical responses are provided to research and technology providers, who then propose new and continuing projects to address identified needs. Individual proposals provide more defined work scopes and estimated cost, schedule, and performance milestones to assist Focus Areas in planning a national program. Proposed projects are documented in the Technical Task Plan (TTP) format for later use in the budgeting and execution processes. The technical response is also electronically stored and accessible in the IPABS-IS and TMS.

During this time, OST guides Field-conducted activities, including:

- Performing life-cycle cost estimating for innovative technologies
- Conducting peer reviews for Focus Areas and end users
- Supporting regulatory acceptance of new technologies.

4.1.3 Multi-Year Program Planning

Focus Areas compile the technical responses (i.e., proposed projects) for EM-wide integration and budgeting. The resulting information form Work Packages (WPs), which are compilations of individual projects representing related sets of well-defined technical or programmatic activities focused on solving a common problem at one or more sites. These documents are EM's primary S&T roadmaps detailing problem sets, planned technical investments, performance measures, and projected outcomes associated with those investments. They are used for planning purposes by both site cleanup project managers and the S&T community. WPs also provide the basis for EM's S&T budget requests.

WPs are the technical program portion of the Focus Areas' MYPPs. They reflect the scope of work that can be accomplished at different budget levels so funding distribution impacts can be evaluated during budget deliberations. The MYPP, updated annually, is a key OST planning document developed with and endorsed by the end-user community via each Focus Area End-User Steering Committee. The MYPP is the collection of prioritized responses to site needs that are fully integrated into end-user projects/programs, and represents all planning activities accomplished during the planning year (see Figure 4.6).

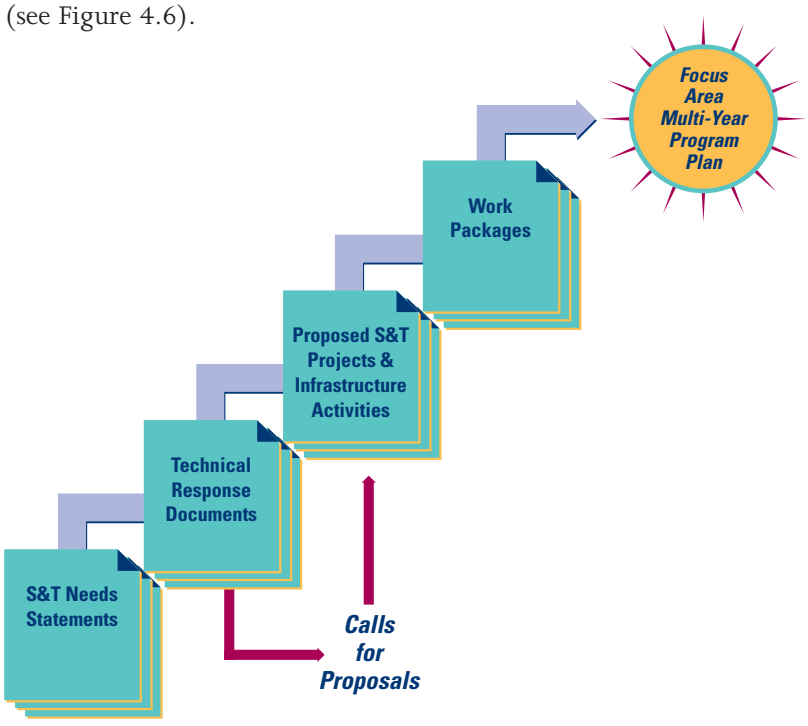


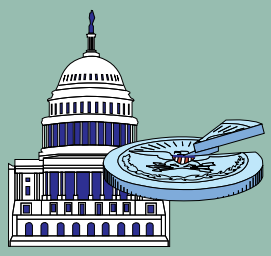
Figure 4.6 - OST Planning Products.

4.2 Budgeting

Focus Area MYPPs and detailed WPs generated in the OST planning process provide the basis for OST's budget formulation. OST prepares a budget request to meet as many high-priority needs as possible. This process includes budget guidance, national integration and prioritization, and participation in the Department-wide budget request cycle needed for approval.

The MYPP assures:

- ***Well-defined programs to meet EM end-users' needs***
- ***Life-cycle cost estimates and schedules for technology solutions***
- ***Integration of OST activities into EM end users' schedules and budgets***
- ***Increased potential for successful deployments of innovative technology solutions***
- ***Support for subsequent budget formulation activities***
- ***Problem area S&T roadmap for the EM R&D Program Plan.***



Budgeting is based on a hierarchical needs prioritization.

4.2.1 Budget Guidance

OST budget formulation reflects the key elements of the OST programs:

- *Technology Development (including the Technology Acceptance and Support)*
- *Science*
- *Risk.*

The DOE Chief Financial Officer (CFO), with Chief Information Officer (CIO) support, determines and issues annual budget guidance for preparing the Department's budget requests, including EM funding targets and requirements. Based on CFO and EM guidance, OST Headquarters prepares and issues guidance and requirements, for items unique to OST budget formulation needs, to Focus Areas and other OST programs. This covers funding targets for each Focus Area and program, OST national prioritization criteria, OST corporate strategy and goals, format requirements, and related information.

OST programs formulate their budgets in line with this budget guidance. WPs developed during the planning process are used as a major source of information in the initial budget formulation stage.

Supported by the IPABS-IS, each of the three major OST programs is organized into a PBS.

4.2.2 Work Package Prioritization

The prioritization process ensures that technologies are funded to meet critical end-user needs.

OST conducts a WP prioritization process within each Focus Area. Using common attributes across all Focus Areas, this iterative process begins at the site problem level and progresses to higher levels and greater breadth with each step. Using plans and documents that guide priority setting (e.g., *Paths to Closure*, Disposition Maps, Critical Pathway Analyses), Focus Areas, with the Focus Area's End-User Steering Committees, thoroughly review, prioritize, and modify the WPs. The resulting information is used to prepare, justify, and defend the OST budget request, based on OST Headquarters guidance, to EM, DOE, Office of Management Budget (OMB), and Congress.

4.2.3 OST National Prioritization and Integration

A multi-attribute analysis national prioritization process is then applied to the WPs. Management guidance, provided at the beginning of the process, identifies the scope of activities to be conducted, budget constraints, and policy guidance, such as Congressional direction. Factors considered in scoring the WP are based on the proposed project's ability to:

- Meet high-priority site needs
- Support high-visibility projects
- Accelerate technology deployment
- Reduce technological risk
- Reduce cost of EM cleanup projects.

Quantitative models must be tempered by human judgment and sensitivity to non-quantifiable factors. Outputs from the decision analysis model are reviewed by Focus Area End-User Steering Committees. As there is not sufficient

funding for all prospective WPs, informed judgment must help decide which projects should receive the highest priority. End users and stakeholders at the sites, working within the Focus Area structure, help develop the priority lists forwarded to Headquarters.

The result of this national prioritization process (Figure 4.7) is an OST Integrated Priority List of all WPs. EM's Deputy Assistant Secretaries (DASs) and DOE's Field Office Managers review and approve a final OST Integrated Priority List, which becomes the basis for OST's budget request.

The OST Integrated Priority List, budget request, and supporting information, prepared and submitted by Focus Areas and other programs, play critical parts in defending and justifying the OST budget.

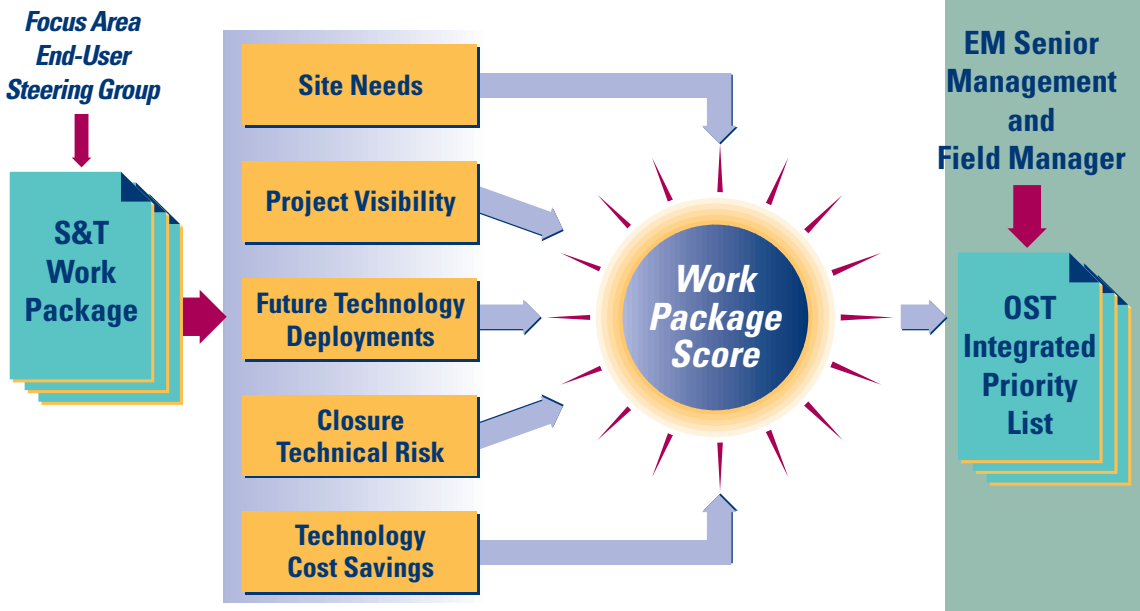


Figure 4.7 - National Prioritization Process.

In summary, the overall priority setting process considers input from sources at all OST organizational levels, from stakeholders and end users, up to program and Headquarters management. In addition to multi-objective decision analysis results, the judgments and experience of OST personnel and OST end users are instrumental in determining the final priorities that guide budget submittals and work plans. Figure 4.8 shows the conceptual flow of information in the OST prioritization process.

Each involved party has a role to play in site cleanup prioritization.

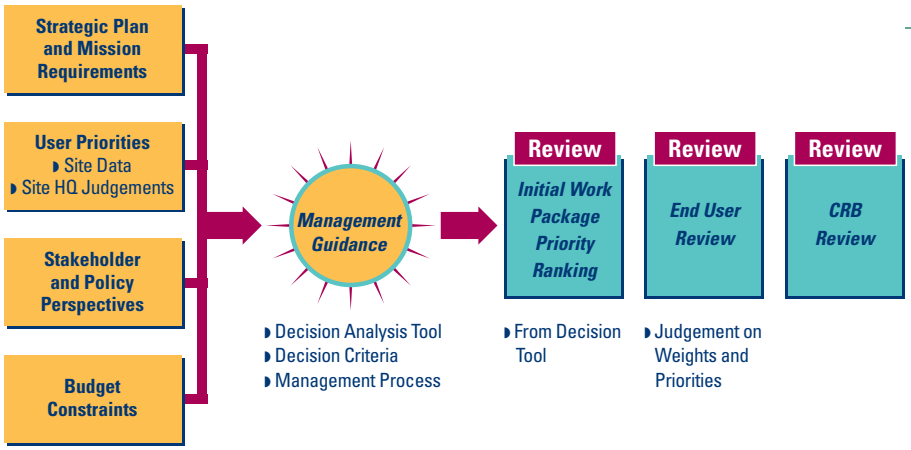


Figure 4.8 - EM S&T Priority Setting Process.

4.2.4 OST Budget Requests and Presentation

The proposed EM budget is presented at the annual EM Corporate Forum, and then sent to the Secretary of Energy for review. The revised budget is forwarded to Congress and, after inclusion in the Congressional Appropriations Bill, is signed into law by the President.

Figure 4.9 depicts a high-level view of the EM budget process and the flow of information and decisions to obtain Congressional approval. OST presents the OST Integrated Priority List at the annual EM Corporate Forum meeting, which focuses on corporate direction/decisions and outstanding issues relative to the EM budget request. A formal budget presentation is made to the Secretary of Energy, with recommendations from the CFO and EM on issues resolutions. EM receives Secretary decisions on budget issues and an EM budget allocation from the Department.

EM and OST then update the budget request and submit it to OMB. Based on OMB recommendations, EM submits a revised budget request to Congress. OST Headquarters keeps Focus Areas and programs apprised of new developments and changes as the budget proceeds through the Congressional markup process until it is passed in a Congressional Appropriations Bill and signed into law by the President.

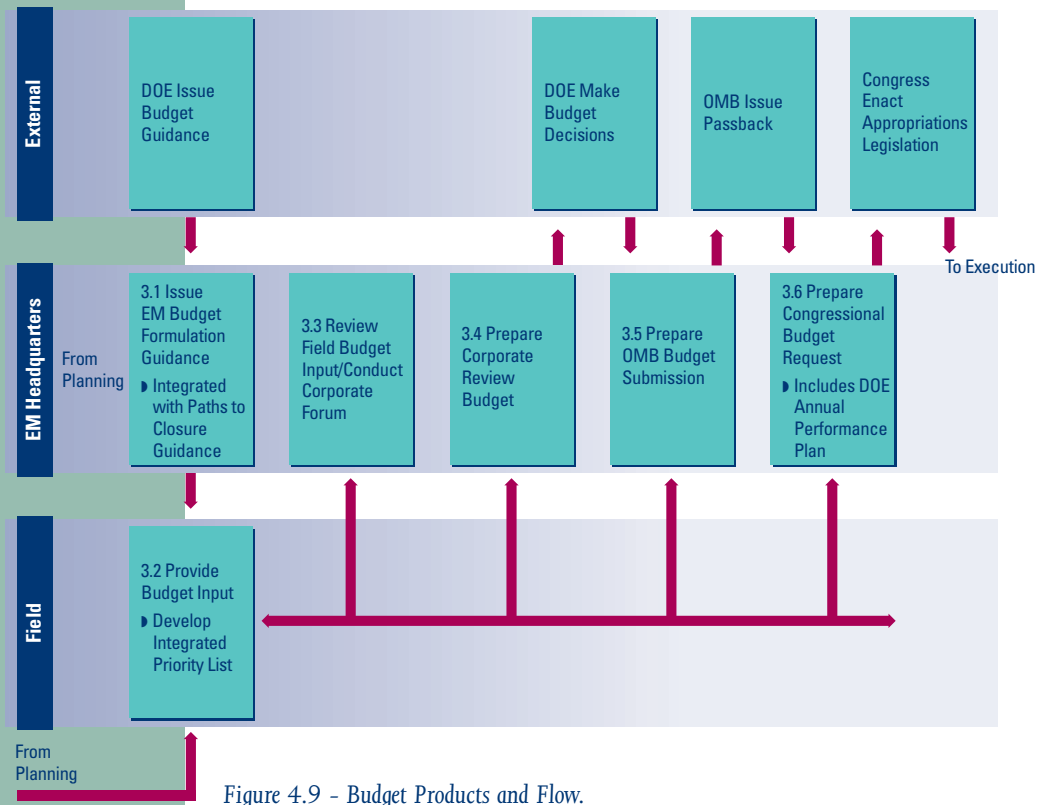


Figure 4.9 - Budget Products and Flow.

4.3 Execution

OST program execution, which is initiated prior to the start of the execution year, begins with developing a Program Execution Guidance (PEG). Those staff members responsible for the PEG activities develop and issue guidelines, define and approve baselines, distribute funding, report and monitor work performance, and control baseline change.

Executing programs is left to the experts.

4.3.1 Program Execution Guidance

Prior to the beginning of each execution year, OST defines the work scope and funding for each activity identified in the WPs. This is accomplished through iterative negotiations between Focus Areas and technology providers, with inputs from the Focus Area End-User Steering Committees on individual proposed projects.

After final work scope and funding have been identified, OST Headquarters issues the final PEG to the Field Office TPOs. In response, TPOs prepare formal TTPs and submit them to Focus Areas. These documents provide the specific work scope, funding profile, schedule, milestones, and deliverables upon which work performance will be evaluated. The TTP is a detailed work plan for a proposed solution's life-cycle development and deployment, and also provides information on technical history, past performance, and maturity of the selected technology(ies). These TTPs are rolled up into the WPs.

The PEG summarizes work scope, funding, and reporting expectations for each funded activity.

4.3.2 Funds Distribution

The Approved Funding Plan (AFP), used by the Department to allocate funds to specific Field Offices/contractors, is a monthly CFO document that identifies funds available for obligation and expenditure. It also establishes the framework for reporting financial data and technical progress for the execution year.

Most OST projects are continuations of existing work, as they are multi-year efforts. However, new work scopes and proposed methods for procuring the work may be identified during the planning process. A new work scope is generally initiated through competitive procurement to ensure that the best talent has the opportunity to respond to EM's key problems. OST programs issue either targeted or broad solicitations depending on the work scope. Generally, new efforts in applied research are broadly announced to the larger scientific audience, while near-term deployment opportunities, requiring a more rapid response, may be targeted at the private sector.

New work is awarded on a competitive basis to the contractor team that submits the best site cleanup proposal. Schedule and cost factors are important considerations.

Appendix H provides a brief overview of the principles used by OST to procure work. Within that framework, OST's goal is to compete every possible item of work that would benefit from competitive procurement. The underlying goal is to achieve economies of scale and stimulate new ideas and technology coming into the EM arena.

4.3.3 Reporting and Monitoring

OST monitors its program to ensure adherence to work scope, schedule, and cost.

In accordance with the baseline information contained in each TTP and the funding authorized in the AFP, the work begins. As work is performed, the program manager monitors cost, schedule, and project performance using the Progress Tracking System (PTS), which captures monthly work scope, schedule, cost, and milestone data for monitoring a project's progress against determined targets. The TPO oversees task performance and coordinates PTS report submission to EM Headquarters. The Focus Area and program managers work closely with TPOs and technology developers to identify issues and develop remedies to ensure that work is performed effectively and that the technical solution under development meets established objectives. The IPABS-IS will displace PTS in FY 2000.

Individual projects are reviewed on a monthly basis to determine their current status in relation to established cost and schedule plans. Focus Area and program managers also participate in periodic OST Business Reviews. The performance analysis and progress reporting conducted during program execution are key elements of the decision-making process for work continuation and future funding in the planning and budget formulation activities. Section 4.4 discusses the OST review processes in more detail.

4.3.4 Baseline Change Control

OST has a change control process in place for changes in cost, scope, and schedule.

During program execution, both financial and work scope changes may occur due to project adjustments and corrective actions identified in reviews, or to changing priorities and carryover issues. To manage such changes, OST uses a change control process that aggregates all changes according to their financial and work scope impacts.

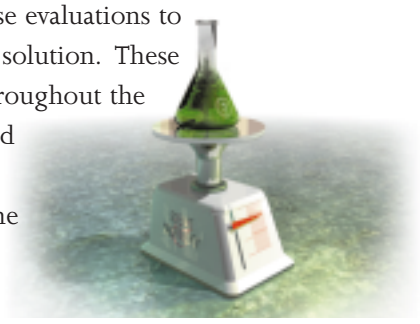
Work scope changes that occur without corresponding financial changes (e.g., milestone adjustment) are jointly approved by the respective Focus Area or other program manager and TPO. Work scope changes with financial changes are implemented through OST Headquarters. All approved changes are updated in the OST Financial Plan Data Report (FPDR) and forwarded to the CFO for processing and distribution to the Field Offices/contractors early the following month.

4.4 Evaluation

OST performance measures reflect the four EM corporate measures for OST referenced in the EM R&D Program Plan:

- *Meet high-priority needs*
- *Reduce the cost of EM's major cost centers*
- *Reduce EM's technological risk*
- *Accelerate technology deployments.*

Ongoing OST programs are reviewed during the course of a year and at key decision points to determine if an effort should be continued or if an alternate strategy should be adopted. End users are involved in these evaluations to ensure their continued commitment to implementing the solution. These reviews help decision-making at all program levels and throughout the technology maturation process. Performance measures and appropriate metrics are critical to these reviews and to the ultimate success of OST programs. OST continues to define sound and meaningful metrics that are outcome-based and developed jointly with end users.



4.4.1 Performance Metrics

New, revised, and refined metrics for OST Program performance are being developed. In defining metrics for each program level, OST will emphasize metrics that can be directly related to cleanup project accomplishments and demonstrate progress toward improving site baseline results. Figure 4-10 illustrates the current direction in developing performance measures and metrics. When fully initiated, end users will evaluate and document these measures. As a whole, they will help EM evaluate the impacts of its investments and determine how effectively its project managers are using scientific advancements and available new technologies to execute their projects.

Performance metrics are being devised to determine the impact of EM's investment and how well project managers are fulfilling their responsibilities.

A key instrument in measuring OST performance is the Annual Performance Plan (APP). This plan, which documents each program's performance indicators, milestones, and deliverables, is required by the Government Performance and Results Act (GPRA) and is intended to ensure OST's funding accountability. At a higher level, APPs represent agreements on the work to be performed and the results to be accomplished with appropriated funds.

The Annual Performance Plan is essential to report if program goals are being achieved on time and within budget. Its conclusions are reported to the Congress and the President.

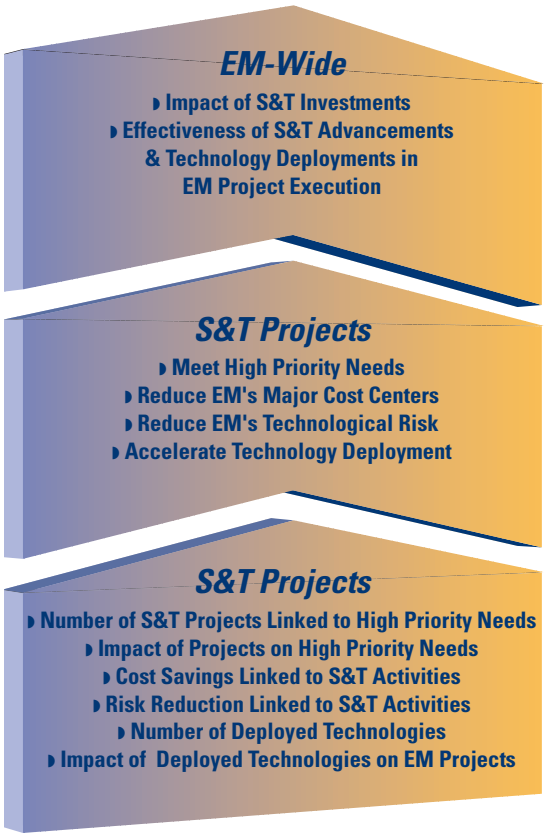


Figure 4.10 - EM S&T Performance Measures.

Within EM, a tiered planning and performance measurement system is used to develop the APP. The highest level is incorporated into the Secretary's performance agreement with the President. Intermediate performance measures and plans are established for program areas and Field elements. Performance results are reviewed by the Secretary and incorporated into the GPRA report to Congress. Through FY 2000, measures include the number of deployments, demonstrations, and technologies ready for implementation with cost and performance data.

4.4.2 Reviews

Reviews are among the most important elements of OST's program management process. Two issues are foremost during EM reviews: scientific (or technical) merit, and programmatic relevance (potential to meet site needs). Key OST reviews are project selection, peer, and mid-year reviews.

Project Selection Reviews

Project selection reviews evaluate the relevance and technical merit of a given proposal to a specific site cleanup program.

The review system begins with reviews of proposals for new research and development activities. These reviews combine the judgments of technical peers and potential users. The EMSP's selection review process is discussed in Section 4.5. With Technology Development, and in response to a Focus Area request for proposals (RFP), interested parties (including those participating in the EMSP) submit proposals that are evaluated for program relevance and technical merit. The Project Selection Review addresses the program relevance aspect, and is conducted by the Focus Areas with the assistance of outside, independent experts. Technical merit is addressed by a peer review, as discussed below.

Peer Reviews

OST peer reviews assess:

- ***Technical excellence***
- ***Relevance of the technology to the problem***
- ***Technical progress***
- ***Productivity***

Peer reviews evaluate the performance and potential of Focus Area programs and specific technology projects, determine the effectiveness and adequacy of funded activities in achieving their intended purpose, and provide input into the decision-making process of Field and Headquarters programs.

Review panel participants include DOE program managers, subject matter experts (SMEs), EM end users, stakeholder representatives, and technology developers. EM end-user participation ensures that technologies in development and being deployed do address end-user needs, and serves to maintain end-user support of technology projects throughout their development life cycle.

Peer reviews are conducted for:

- All potentially new technology development projects, including those transitioning from the EMSP
- Projects ready for full-scale demonstration
- Projects in their third year of OST funding support.

Peer reviews are conducted in the context of the Technology Maturity Gates Model, which is described further in Appendix F. This management tool provides the technology developer with information on what is necessary to move a technology from basic research, through the development process, to deployment.

As depicted in Figure 4.11, the first peer review for a developing technology is performed after the technology has passed through Gate 2, at the beginning of the Exploratory Development phase. As discussed in the Program Selection Review, interested parties and EMSP participants submit proposals to be evaluated for technical merit and program relevance. Based on subsequent peer reviews, proposed projects are selected for further development.

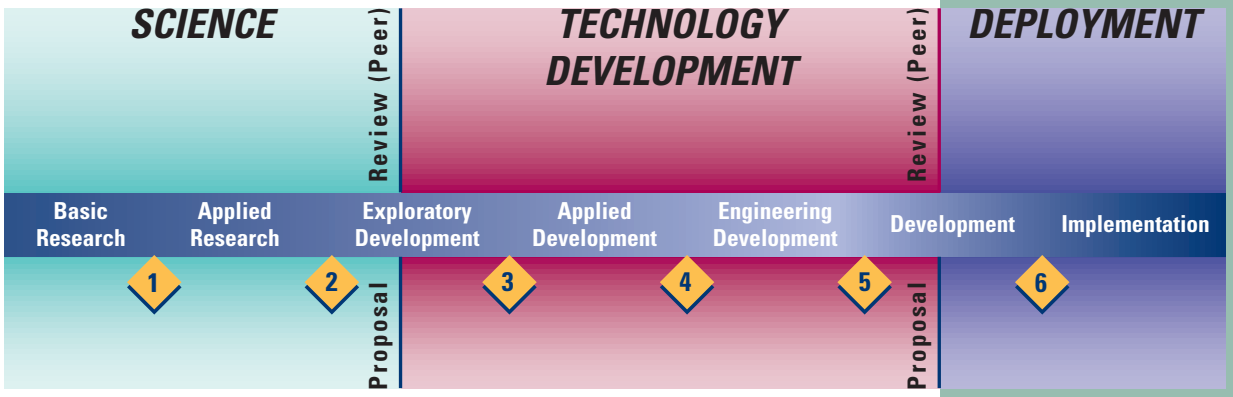


Figure 4.11 - Peer Reviews in the context of the Technology Maturity Gates Model.

The second peer review is conducted before Gate 6 to determine if the technology is ready for full-scale demonstration. This review is implemented and verified by the American Society of Mechanical Engineers (ASME), which provides an external, independent evaluation of technical merit. Appendix G further describes OST's project selection and review system.

Mid-Year Review

Each project is also subject to a Mid-Year Review conducted by Focus Areas and reviewers, including Headquarters and Field Focus Area End-User Steering Committee representatives. This broad management review of a technology portfolio evaluates plans, budgets, and project activities to determine the ability of Focus Area projects to address EM requirements. These reviews also provide opportunities for end users to periodically assess the overall effectiveness of Focus Area activities and to reaffirm their commitment to use successful technologies.

In addition to the management review, the Mid-Year Review panel determines the maturity of each technology in the Focus Areas' portfolios. This determination should be based on an abbreviated set of Gates criteria similar to those established by OST in interim guidance. Applying the criteria developed by the Focus Areas, reviewers evaluate and document how well a technology is progressing through the stages of maturity and what is needed to graduate to the next stage.

The abbreviated criteria also ensure that each project has generated the Gate deliverables established in each project TTP. The relative importance of each criterion varies from gate to gate, and generally increases with higher gates.

Each Focus Area maintains a central file of deliverables from each project that records the technology's maturation progress. Gate deliverables include such documents as cost-benefit analyses, commercialization plans, technical merit review results, and regulator/stakeholder analyses. Focus Areas may add additional requirements specific to their technical and business needs. Focus Areas may also review a project during the normal course of project management that is separate from the Mid-Year Review.

Mid-year review criteria ensure that the technology:

- ***Meets end-user needs***
- ***Has technical merit***
- ***Has cost benefits and funding***
- ***Reduces safety, health, and environmental risks (or at least does not increase risk in comparison to baseline and alternative technologies)***
- ***Addresses stakeholder, regulatory protection, and tribal issues***
- ***Has commercial viability.***

OST uses review inputs and results to validate current strategies and funding investments, identify gaps and new strategies, select projects, and enable work continuation and future funding decisions.

The NAS/NRC and EMAB participate in ad hoc reviews for EM, which helps to address the problems of greatest significance.

Review results are also used to document progress, performance, and achievements of OST programs in reports to DOE senior management, Congress, and the public. All reviews culminate in written assessments, often followed by Focus Area-developed action plans that delineate steps to correct deficiencies or take advantage of new opportunities. The documented findings and recommendations of the Mid-Year Review guide APP and PEG development for the forthcoming execution year.

Other Reviews

The National Academy of Sciences-National Research Council (NAS/NRC) conducts ad hoc reviews for EM. In addition to the NAS, the Environmental Management Advisory Board (EMAB) reviews programmatic aspects of EM S&T investments. These ad hoc reviews generally address broad program issues and help guide EM to address problems of greatest significance to DOE.

Examples of specific reviews in which OST participates and/or conducts are in Figure 4.12.

Management Activity	Review Type	Objective
Planning & Budgeting	Mid-Year Program	Evaluate relevance, cost, schedule, technical merit, productivity, and maturation of ongoing S&T projects to support next-year project plans.
	Project Selection	Evaluate new R&D proposals for technical merit and programmatic relevance for selection and funding.
	Cost Savings	Evaluate potential cost savings analysis conducted by the Field.
Execution	EM Quarterly Management	Assess overall EM Program performance including completion of milestones, corporate performance measures, and financial performance.
	OST Business	Assess overall OST Program and project performance including completion of milestones, corporate performance measures, and financial performance.
	TMS Data Quality	Assess the quality of information and data that describes the progress and performance of research and deployment activities supported by OST.
Evaluation	Peer	Evaluate new and ongoing projects for technical excellence, technical approach and requirements, progress, and productivity.
	Program/ Project	Evaluate technology maturity for advancement to next development, demonstration, or deployment stage (technology gate).

Figure 4.12 - OST Reviews.

4.4.3 Verification and Validation of Deployment Performance

Deployment of technologies is a key performance measure in the OST Program. Along with other performance measurements, deployments are

planned through IPABS, which considers GPRA external reporting requirements (discussed in Section 4.4.1). The sites provide quarterly deployment progress status reports at the EM-wide Quarterly Management Reviews. To support this process, Focus Areas, with input from the sites, develop a Deployment Fact Sheet (DFS) on each site's deployments. These fact sheets document the extent of use of a specific technology across the complex.

OST reviews and documents technology deployment, both internally and (as available) externally, to the DOE complex. This process allows communication between Focus Areas and end users who validate the use and performance of the technologies at their respective sites.

Deployments are verified in four steps to ensure high confidence in OST's deployment information. The first step is to have Focus Area and Field Office staff identify inconsistencies in technology deployment claims. The second step, once issues are resolved, is to forward the full listing of Focus Area and non-Focus Area technology deployments at DOE sites, as well as DFSs on Focus Area technologies, to the Field Office managers for site verifications. As a third step, the internally sponsored Technology Achievement Study investigates each Focus Area claim through vendor and site user contacts. Finally, in response to the need for independent validation, an independent contractor validates a sampling of the deployments. For ongoing data confidence, OST uses only this last independent sample-based verification after Field Office confirmation.

Deployment verification comprises:

- ***Identifying/resolving inconsistent technology deployment claims***
- ***Verifying technology deployments***
- ***Investigating Focus Area claims***
- ***Using an independent contractor to validate a sampling of deployments.***

4.5 Management Activities of the Environmental Management Science Program

The development, implementation, and execution of EM's investments in basic research is managed somewhat differently from the technology development management process. OST's basic research is accomplished through a partnership between OST and the Office of Science. This partnership was created to ensure that EM basic research investments directly support the development of new and improved solutions to DOE cleanup problems, and that the research is scientifically meritorious. OST, through the EMSP, is the lead solicitor of research needs from cleanup project managers. This ensures that selected research projects have application to the Department's cleanup problems, and that research results are communicated to Department and contractor personnel with cleanup responsibilities.

OST's basic research is the result of an OST-Office of Science Partnership.

OST is the lead solicitor of research needs and manages the final aspects of the program.

OST also manages the financial aspects of the EM basic research investments. The Office of Science manages the actual solicitation of research proposals and the scientific review process, and assists Focus Areas with the research program's technical management. The DOE Idaho Operations Office conducts needs analyses, provides financial management and procurement support, and serves as an interface with other DOE Field offices and Focus Areas.

The Office of Science manages the actual solicitation of proposals and the scientific review process, and works with the program's technical managers.

The first step in EMSP's research grant award process (Figure 4.13) is to identify research needs that affect EM's ability to address its cleanup responsibilities. This dynamic process requires the program to continually update its research needs as some of EM's problems are solved and others emerge, evolve, or change. Several information sources are used to identify research needs: site-specific workshops, a complex-wide research needs survey, an evaluation of the needs identified by the Focus Areas, and analyses of the *Baseline Environmental Management Report* and PBS information developed for *Paths to Closure*.

Once research needs are identified, a call for research grant proposals is developed and published in the *Federal Register*. In response to the solicitation, a preapplication may be submitted as an applicant's intent to submit a formal grant application. A preapplication allows the potential applicant to receive a response from the Department on the suitability of the proposed research project to the Department's interests. All preapplications are screened by the Office of Science to ensure that applications focus on basic science, and by EMSP to ensure that applications address questions relevant to site-identified environmental problems. Preapplications are encouraged, but not required.

Once preapplications are screened, applicants submit their formal proposal for review. The Department uses a two-phased formal proposal review process to ensure the most scientifically meritorious and relevant proposals are selected. The first phase, "initial review," includes external peer reviewer experts in specific scientific disciplines. Evaluation during the first phase is advisory. The second phase includes environmental management scientists and engineers most familiar with EM's needs and may be potential end users of the research results.

Successful projects are awarded a 3-year grant to perform basic research. Each project must submit an Annual Progress Report, and the entire research portfolio is reviewed annually to determine future needs.

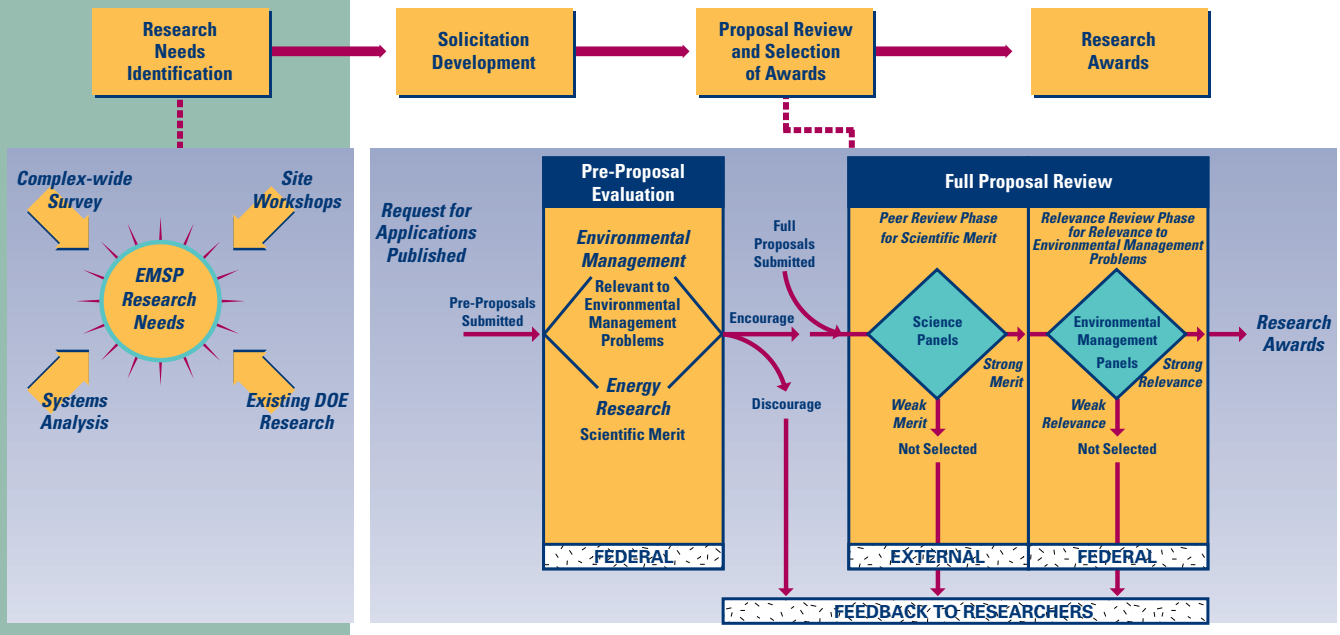


Figure 4.13 - EMSP Research Grant Award Process.